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Research on the Application of Precast T-beam Construction Technology in Bridge Construction

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Abstract: Prefabricated T-beams are widely used in bridge engineering in China. In this article, the construction technology of prefabricated T-beams is clarified. The characteristics of current prefabricated T-beam technology in bridge construction and construction are discussed and explained based on the actual situation of bridge engineering.. Problems and countermeasures that may arise when erecting T beams are also analyzed.. Precast T-beams are of great significance to the basic construction and development of modern road bridges in China.

Keywords: Prefabricated T-beams; Bridge Engineering; Basic Construction

1. Application of precast T-beam construction technology

Many technologies have been used in the fabrication and construction of prefabricated T-beams. For example, the installation of prefabricated T-beams needs to be regulated when laying T-beams, the pre-archedness of prefabricated T-beams is controlled, and the value of the reverse arch of the support is strictly controlled. Controlling the erection time of prefabricated T-beams not only has higher requirements on the technical level, but also can improve the engineering efficiency and speed up the progress.

In the concrete pouring project after the T-beam being laid, it is necessary to standardize the concrete construction technology, do a good job of raw material review and control, and standard mixing and processing. Control the pouring link when pouring, and strictly control the concrete raw materials and accurately position the corrugated pipe when pouring the concrete to prevent damage to the corrugated pipe during the operation of the reinforcing steel skeleton. After pouring, maintenance control should also be done. Other technologies used in prestressed construction operations, one should strictly control equipment and facilities, tensile prestressing, and the standardization of anchoring operations and support sill construction.

2. Main operating methods of beams

Girder construction is generally divided into prefabricated T-beam operations, concrete pouring and formwork dismantling and maintenance after reaching final setting. The engineering sequence and application of the technology shall comply with the specifications and shall not be changed at will.

2.1 Precast T-beam construction

The construction sequence begins with the construction of the T-beam prefabrication yard. The steel is cut and bound to the vertical formwork, and the concrete is poured to the final setting and the mold is dismantled. The pre-

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stressed steel beams are tensioned, and the mortar is finally sealed after anchoring.

The binding of the reinforcing steel skeleton is used as a pre-engineering project to make the prestressed T beam. The cross points of the reinforcing steel are tied with thin wires to make the reinforcing beam of the T beam stable and strong. Unless specified in the design, the main reinforcement and the stirrup in the T beam should be connected to each other vertically. When binding the reinforcing steel frame, the ends of the stirrups should be bent inward appropriately, and the junctions of the corners of the stirrups with the reinforcing bars should be tied with thin iron wires. In the beam, the joints for the stirrups (hook joints) should be inserted in the longitudinal direction. At the same time, bend the iron wire that binds the reinforcement inward, so that the thin iron wire is not inside the protective layer. The binding arrangement of all reinforcing steel frames must be carried out strictly in accordance with the dimensions specified in the drawings, and it must not be altered without authorization.

The bundling of reinforcing steel joints generally requires the connection point of the bent corners of the reinforcing steel bars and the longitudinal distribution rods. When the large and small stirrups on the lower edge of the bridge are connected, interlacing and bundling should be used to make the bundling and binding points firm. If the wire is broken, it must be re-bundled and each banding point shall be banded according to the "figure" to ensure that the shape of the steel frame skeleton does not change after the banding. Reinforced skeleton at the junction point.

After the inspection of banded steel bars is completed and qualified, install corrugated pipes and steel strands. Double-sided electric welding is used when the steel bars are connected to the steel plates. When welding steel bars by arc welding, the length, width and thickness of the weld seam should be in accordance with the drawings and then welded to ensure its shape. After installing the prestressed tendons, the installation needs to be installed strictly according to the designed position. Improper installation of the position will cause structural quality problems. Finally, after the installation of the prestressed tendons, a transverse bulkhead is added. In this process, the stability of the reinforcement is controlled appropriately, and then the stability detection and the binding of the roof reinforcement are performed.

2.2 Pouring of concrete

Check separately the acceptance of concrete pouring in response to the bracket, formwork, steel and embedded parts, in order to meet the requirements before pouring concrete. The accumulated debris, water and stains on the steel bars on the T-beam formwork should be cleaned in time and coated with a release agent on the inside and outside of the formwork. The concrete should maintain a free height of no more than 2 meters. If it reaches a dumping height of more than 2 meters, it should be lowered through pipe strings, slides and other facilities. When the dropping height is 10 meters, the speed reducer should be installed.

When pouring concrete, it should be layered according to a certain thickness, order and purpose. For layered pouring, the upper layer should be poured first and then the lower layer should be poured. When pouring the upper and lower concrete at the same time, the distance between the upper and lower layers should be kept as high as 1.5 meters or more.

2.3 Formwork removal

When installing and removing the T-beam formwork, care must be taken when installing the T-beam formwork to prevent the ribs of the beam from colliding with the diaphragm reinforcement. The first eccentric gantry crane spreader template transfer position is fixed to the place where the pull-up penetrates by adjusting the adjustment screw. A template is used to fix the bolts well to assemble the adjacent sections. After the T-beam concrete reaches 2.5Mpa, the t-beam formwork is removed symmetrically in sections, and each formwork is immediately supported at the same time. When the template is removed, hook the upper ring of the template with a gantry crane, remove the connecting bolts and the bottom adjustment block, and pull the lower edge of the template by hand.

3. Construction common problems and treatment countermeasures

3.1 Pre-stressed engineering (tension) pre-stressed steel strand breaks and slips

The reason for this phenomenon is that the jack, anchor ring and hole edge are misaligned when tensioning the pre-stressed steel strands, the deeds are loose and tight during the construction, and the diameter difference between the laid steel strands is large or partial damage. The hardness of the anchor ring is not satisfactory, the poor tolerance of the taper tolerance of the anchor ring and the plug and the anchor pad plate is not perpendicular to the hole edge cause the pre-stressed stranded wires to break and slip.

When handling stranded wire breakage and slippage, if the stranded wire exceeds the requirements of the specification, it should be replaced in principle. If it cannot be replaced for some reasons, it can be remedied under the allowable conditions. Increasing his prestress value, such as adding a prestressed beam, must meet the requirements of each stage of the limit state design. Broken wire or slip wire per share does not exceed 1 strand of steel wire refers to a single strand of broken wire, and the total number of broken wires per share does not exceed 1% of the total number of broken wires.

When the prestressed tendons are tensioned, it is necessary to accurately install the anchors and jacks. When the prestressed tensions are found, the oil pressure decreases when it reaches a certain tonnage, and then it drops after refueling, which may cause fracture. When the wire breaks, the prestressed steel bundle should be replaced immediately, and the prestress is re-applied to make it stretch. Meanwhile, the pretensioned tendon must be cleaned before tensioning.

3.2 Blockage of holes during concrete pouring

During the concrete pouring process, the plasma generates pre-stressed pores that leak, leading to more severe blockage of air holes. The leakage of slurry during the pouring of concrete changes the friction between the channels and can cause blockage of the channels. The clogging of the channels changes the pre-tensioned tensile length, so the pre-stressed tendons cannot penetrate the channels blocked by the mortar.

In order to prevent the channel from being blocked during construction, the concrete vibration should prevent direct contact with the corrugated pipe. During the welding of steel bars, the intermediate pipe joint of the bellows wall should be prevented from being damaged by welding sparks. The bell mouth of the pipe joint and the anchor plate and the seal must be solid and not easy to detach and the leakage of mud. Before the poured concrete reaches the final setting state, the pipeline can be flushed with high-pressure water, and the pipe can be checked to ensure that the pipeline is unobstructed.

3.3 Insufficient thickness of the protective layer of the steel bar

When the concrete is poured, the concrete pads are displaced or the pads are barely exposed, which will cause the reinforcing bars to fall or move outwards, bringing the reinforcing bars closer to the formwork. Segregation that occurs when the concrete protective layer is too small or the mixing ratio is not appropriate.

The method to deal with such phenomena is to correctly determine the position of the reinforcement and the thickness of the protective layer when pouring concrete, strengthen real-time detection, and correct in time when deviations are found, and the concrete should ensure that the mix ratio is accurate and easy.

3.4 Bubbles in the honeycomb hemp surface on the surface of the poured concrete with water ripples

When concrete is poured, because of poor concrete workability or improper vibrating method, which results in incompactness, it is difficult to exhaust the cross section of the T-beam web. phenomenon.

The coping method is mainly to adopt the correct pouring measures of the attached vibrator to vibrate, adopt the layered pouring method to the bottom of the beam, and the thickness of the concrete in each layer should not be greater than 30cm. The pouring sequence should be pushed from the tail to the middle and the original concrete. Collapse to ensure that the mortar is spread evenly with crushed stone.

To ensure a good connection between the layers, the corrugated pipe should be inserted into the lower concrete surface 5 to 10 cm away from the concrete when vibrating. Finally, use a spatula to smooth the two bottom surfaces. When the concrete is finally set, it should be sprinkled and maintained until the concrete stays wet every day before being stretched.

4. Conclusion

With the rapid promotion of urbanization and rapid economic development, the country has set up bridges in relatively complicated geographical locations during the process of moving westward. The bridges represented by prestressed T beams are summarized and discussed in actual construction. Strengthening the management during the construction process using prestressed T-beam bridges to improve the overall structural level of the bridge and the quality of construction technology directly affect the safety and stability of the entire bridge structure.

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